EVALUATION OF MACULAR ISCHEMIA IN EYES WITH CENTRAL RETINAL VEIN OCCLUSION: An Optical Coherence Tomography Angiography Study(Abstract_要旨)

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論文題目	EVALUATION OF MACULAR ISCHEMIA IN EYES WITH CENTRAL RETINAL VEIN OCCLUSION: An Optical Coherence Tomography Angiography Study （光干渉断層計血管造影による網膜中心静脈閉塞症に併発する黄斑虚血の評価）		

（論文内容の要旨）

In eyes with central retinal vein occlusion (CRVO), a circulatory disturbance in the trunk of the central retinal vein causes retinal exudates and nonperfusion affecting the entire retina. If these pathologies affect the macular area, visual function is directly and severely impaired. However, the visual prognosis in eyes with CRVO has improved since the advent of anti-vascular endothelial growth factor (VEGF) agents for the treatment of macular edema (ME).

The clinical significance of ME in eyes with retinal vein occlusion (RVO) is well known, but that of macular nonperfusion remains controversial. Finkelstein D. 1992 reported that the visual prognosis in eyes with incomplete macular perfusion was better than in eyes with complete macular perfusion. By contrast, other researchers have reported a marked decrease in retinal sensitivity in the macular nonperfusion area (NPA) (Yamaike N et al. 2009, Ota M et al. 2012). Furthermore, anti-VEGF therapies were reported to prevent enlargement of the NPA and to promote reperfusion in eyes with RVO.

In addition, even if the ME is completely resolved, VA often remains compromised when the foveal photoreceptors are damaged seen on optical coherence tomography (OCT). Most recently and by using OCT Angiography (OCTA), Kadomoto et al. 2017 reported that visual acuity was more strongly associated with the para-foveal NPA than with the integrity of the foveal photoreceptor layer in eyes with branch RVO.

However, little relevant information is available on the association between visual function and macular pathology in eyes with CRVO.

The aim of this study was to quantitatively assess macular perfusion status using OCT and OCTA in eyes with aflibercept-treated CRVO and resolved macular edema and to investigate the impact of macular morphology and perfusion status on visual function.

This prospective consecutive case series included 23 patients with CRVO. All patients received intravitreal aflibercept injections before analysis. Visual acuity, macular sensitivity, and the macular nonperfusion area (NPA) were evaluated in eyes without ME. The macular NPA was evaluated by OCTA using 3 mm × 3 mm images of the macula. Foveal ellipsoid zone disruption was also analyzed.

This study found that the superficial macular NPA measured 4.15 mm ± 0.71 mm (95% confidence interval 3.85-4.46), and the deep macular NPA measured 4.23 mm ± 0.97 mm (95% confidence interval 3.82-4.56). The logarithm of the minimum angle of resolution (LogMAR) VA was significantly associated with foveal ellipsoid zone disruption (P = 0.001), the superficial macular NPA (P = 0.015), and the deep macular NPA (P = 0.018). Macular sensitivity correlated negatively with LogMAR VA (P = 0.007), the superficial macular NPA (P = 0.029), and the deep macular NPA (P = 0.040), but not with the foveal ellipsoid zone disruption (P = 0.435).

In conclusion, OCTA is a novel technique that enables segmented evaluation of the macular perfusion status in eyes with CRVO and provides visual prognostic information. Enlargement of the macular NPA in the superficial and deep layers was significantly correlated with impaired VA and with decreased macular sensitivity in patients with aflibercept-treated CRVO and resolved ME. The superficial macular NPA (P = 0.029), and the deep macular NPA (P = 0.040), but not with the foveal ellipsoid zone disruption (P = 0.435).

In conclusion, OCTA is a novel technique that enables segmented evaluation of the macular perfusion status in eyes with CRVO and provides visual prognostic information. Enlargement of the macular NPA in the superficial and deep layers was significantly correlated with impaired VA and with decreased macular sensitivity in patients with aflibercept-treated CRVO and resolved ME.

（論文審査の結果の要旨）

網膜中心静脈閉塞症(central retinal vein occlusion：CRVO)の視機能障害の原因として、黄斑浮腫の存在、その程度がこれまで重要視されてきた。近年、黄斑浮腫に対して、抗 vascular endothelial growth factor (VEGF) 薬が使用可能となり、CRVO 患者の視機能予後はこれまでに比べて向上しつつある。しかし実臨床では、抗 VEGF 治療によって黄斑浮腫が吸収しているにも関わらず視機能改善が限定される例に遭遇し、その原因はこれまで不明であった。網膜循環状態の評価方法として、最近、optical coherence tomography (OCT) 技術を応用した OCT angiography が開発され、急速に眼科臨床に普及しつつある。OCT angiography はこれまでの蛍光眼底造影と異なり、網膜血管の構造を毛細血管レベルで、かつ、網膜の層毎に評価することが可能である。本研究では、この OCT angiography を用いて、CRVO 患者の黄斑部の網膜無灌流領域を網膜の層毎に定量的に評価し、CRVO 患者の視機能障害の原因として、黄斑虚血の関与を示したものである。

本研究は、CRVO に伴う視機能障害の病態理解の向上に貢献し、今後の病態の評価、治療効果の判定に寄与するところが多い。

したがって、本論文は博士（医学）の学位論文として価値あるものと認める。なお、本学位授与申請者は、平成 30 年 2 月 20 日実施の論文内容とそれに関連した試問を受け、合格と認められたものである。

要旨公開可能日：　　年　　月　　日　以降